Econ330 – Money and Banking
Solutions to Problem Set 2

Question 1

The value of the deposit after 5 years will be

$$D = \$1,000 \cdot (1 + 0.10)^5 = \$1,610.51.$$

If the inflation rate is 5% per year, the real interest rate is $r = 10\% - 5\% = 5\%$. The real value of the loan will then be

$$D_r = \$1,000 \cdot (1 + 0.05)^5 = \$1,276.28.$$

The value of the loan after 3 years will be

$$L = \$1,000 \cdot (1 + 0.12)^3 = \$1,404.93.$$

These instruments are not the "standard" in the economy. If you had not found Best Interest Bank, you would have made a deposit with an 8% interest. Similarly, if you weren't in that much of a rush to get a loan from The Loanshark Inc., you would have gotten a loan for 8% a year. Hence, to calculate the present values of these two financial instruments, we will use the economy-wide interest rate of 8%. So, the present value of the deposit is

$$PV(D) = \frac{\$1,610.51}{(1 + 0.08)^5} = \$1,096.09,$$

and the present value of the loan is

$$PV(L) = \frac{\$1,404.93}{(1 + 0.08)^3} = \$1,115.28.$$

Since the present value of the loan is greater than the present value of the deposit, you are at a loss overall.

Question 2

Because of the definitions of the various indicators, you were not able to calculate all four of them for all the bonds listed.

(i) For a discount bond, the current yield is meaningless since it is based on coupon payments – which are not part of the discount bond contract. The discount yield is

$$i_{db} = \frac{F - P}{F} \cdot \frac{360}{\textit{time to maturity}} = \frac{\$1,000 - \$950}{\$1,000} \cdot \frac{360}{365} = 0.0493 = 4.93\%,$$

and the yield to maturity is

$$i = \frac{F - P}{P} = \frac{\$1,000 - \$950}{\$950} = 0.0526 = 5.26\%.$$

To calculate the one-year rate of return, remember that the maturity of the bond is one year. So, one year from purchase, the value of the bond will just be its face value, which means that the rate of return is

$$R = \frac{P_{t+1} + C - P_t}{P_t} = \frac{F + 0 - P}{P} = \frac{\$1,000 - \$950}{\$950} = 0.0526 = 5.26\%.$$

(ii) The value of coupon payments is $C = 5\% \cdot \$1,000 = \$50$. Hence, the current yield is, in this case,

$$i_c = \frac{C}{P} = \frac{\$50}{\$975} = 5.13\%.$$

The yield on a discount basis is meaningless for a coupon bond. Also, due to the very complicated formula, you are not able to calculate the yield to maturity. The one-year rate of return is:

$$R = \frac{P_{t+1} + C - P_t}{P_t} = \frac{985 + 50 - 975}{975} = 6.15\%.$$

(iii) Since coupon payments are $C = 5\% \cdot \$1,000 = \$50$, the current yield is again

$$i_c = \frac{C}{P} = \frac{\$50}{\$900} = 5.56\%.$$

Given that consols don't have a maturity, the yield on a discount basis is meaningless.

The yield to maturity is actually equal (the formula is the same) to the current yield:

$$i = \frac{C}{P} = \frac{\$50}{\$900} = 5.56\%,$$

and the one-year rate of return is

$$R = \frac{P_{t+1} + C - P_t}{P_t} = \frac{925 + 50 - 900}{900} = 8.33\%.$$

Question 3

(i) A fall in expected inflation affects both the demand and the supply for bonds by impacting the real interest rates. For the same nominal interest rate, a fall in expected inflation implies an increase in the real interest rate (remember that $i = r + \pi$). Hence, the return from buying a bond increases and demand will shift to the right. On the other hand, the (real) costs of taking out a loan through a bond increase, because the real interest rate is higher. Fewer agents will be willing to sell bonds, and thus supply shifts to the left. The combined effect, as shown in figure 1(a), is that interest rates fall.

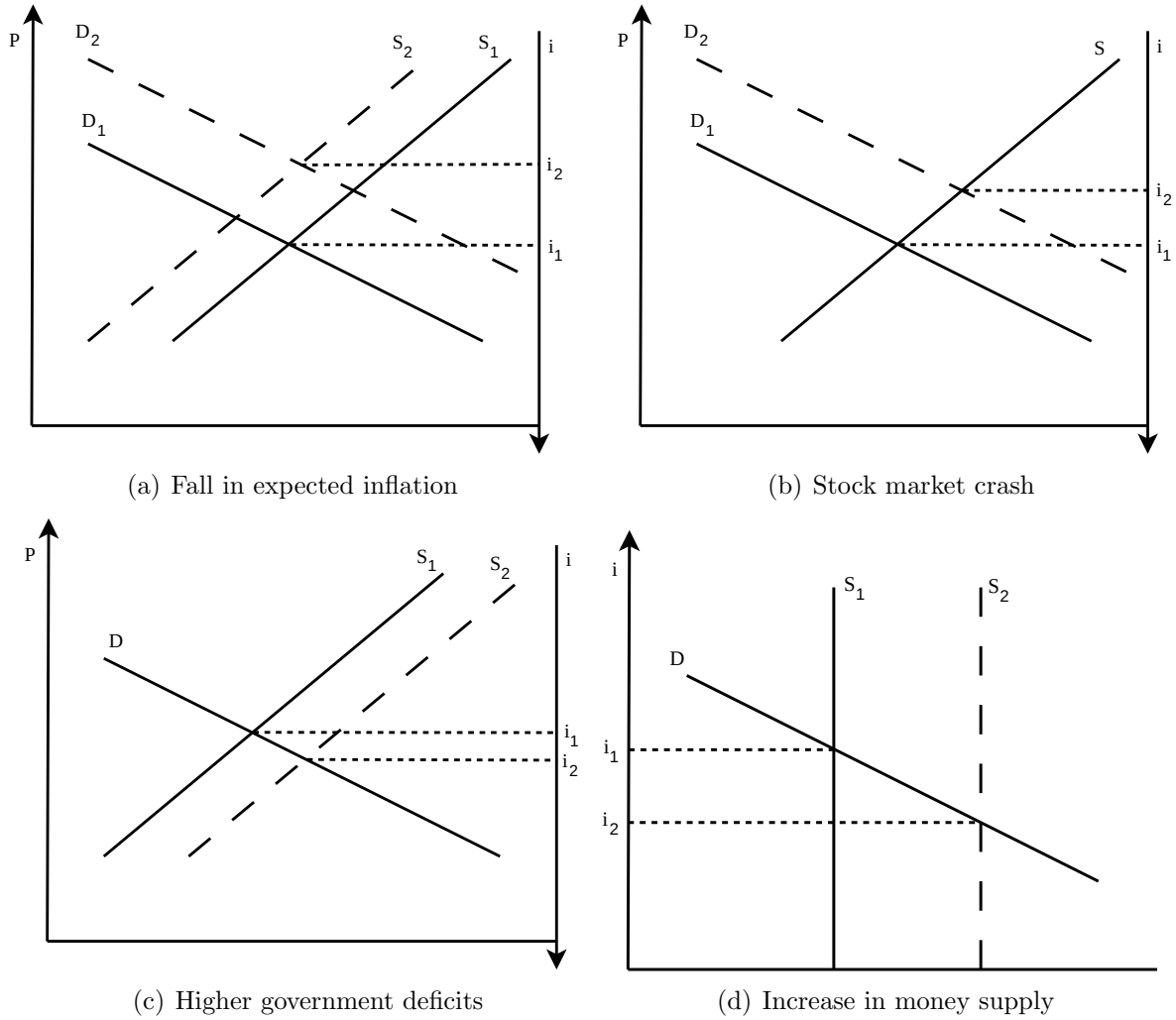
(ii) When the stock market crashes, investors will switch to buying bonds and thus demand increases, i.e. it shifts to the right. As figure 1(b) shows, this leads to a decline in the interest rate.

(iii) Government deficits cause an increase in the supply of bonds because the government has to find funds to finance its expenses, which are higher than its revenues. As a result, the supply of bonds shifts to the right, and thus the interest rate increases (see figure 1(c))

(iv) According to Keynes's liquidity preference theory, an increase in the money supply creates an unnecessary amount of liquidity that the individuals will try to eliminate. They do so by buying bonds, thus driving the interest rate down, as shown in figure 1(d). (You could have also argued that the final effect is ambiguous, since it is unclear whether the liquidity effect dominates or is dominated by the income, price and expected inflation effects).

Question 4

According to the expectations theory, the interest rates on bonds are equal to the average of interest rates for the duration of the bond. The only "trick" is that for the bond bought



(a) Fall in expected inflation

(b) Stock market crash

(c) Higher government deficits

(d) Increase in money supply

Figure 1: The effect of changes in different factors on interest rates.

next year, it is the interest rates starting from next year that are relevant. So, the interest rates for the three bonds are:

(i) three-year bond: $i = \dfrac{5\% + 6\% + 6\%}{3} = 5.67,$

(ii) two-year bond bought next year: $i = \dfrac{6\% + 6\%}{2} = 6\%,$

(iii) five-year bond: $i = \dfrac{5\% + 6\% + 6\% + 5\% + 6\%}{5} = 5.6\%.$